FOOD HABITS OF BLUE AND CHANNEL CATFISH COLLECTED FROM A BRACKISH-WATER HABITAT

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THE IMPORTANCE OF ESTUARIES along the northern Gulf of Mexico is fast becoming apparent to an ever-increasing population. An estuary usually provides a complex environment composed of salt, brackish, and fresh water, with unstable boundaries subject to rapid changes in temperature, salinity, currents, and water levels. The waters of an estuary are among the most fertile in the world and consequently support a tremendous tonnage of fish and other aquatic animals.

South Louisiana's estuaries are known for their high populations of blue catfish (Ictalurus furcatus) and channel catfish (I. punctatus). Both species are common in waters yielding such marine animals as the crab (Callinectes sapidus), shrimp (Penaeus sp.), sheepshead (Archosargus probatocephalus), sand seatrout (Cynoscion arenarius), red drum (Sciaenops ocellata), and southern flounder (Paralichthys lethostigma).

Distributional data from another study (Perry, in press) indicated that a ratio of 2:1 existed between blue and channel catfish in brackish waters of the Rockefeller Wildlife Refuge. Both species were collected from waters with salinities ranging to 11.4 parts per thousand (p.p.t.).

Widespread interest in the blue and channel catfish, along with the scarcity of published ecological information about them in estuaries, prompted the author to begin this study of their food habits.

Materials and Methods

Sample stations were established on the Rockefeller Wildlife Refuge in tidal bayous and canals from the Gulf of Mexico to Grand Lake, a large fresh-water lake. This complex is composed of both natural bayous and constructed canals. Water in the study area was brackish; the salinities ranged from 0.18 to 35.0 p.p.t. The bottoms sampled were high in organic matter and free of rooted vegetation.

Research for this study was begun with the establishment of nine sampling stations on March 11, 1965, and terminated on February 26, 1966. Stomachs of 59 blue and 40 channel catfish were taken by trawl, trammel nets, and trot lines and preserved in a formaldehyde solution or frozen for examination later.

Laboratory food analyses were made as in the following procedure: Stomach contents were sorted and identified, percentage volume of each food item was determined by volumetric displacement, and percentage frequency of occurrence was determined. Intestinal contents were also examined when available.

Summarized results of the food study were recorded by the size ranges which approximated the age groups of an earlier study.

This study was made while the author was a graduate student working with the Louisiana Cooperative Fishery Unit, a cooperative program of the Louisiana State University, Louisiana Wild Life and Fisheries Commission, and the Bureau of Sport Fisheries and Wildlife.

Results and Discussion

Blue Catfish.--In the blue catfish of the smallest size group (95 to 187 millimeters), small invertebrates--including amphipods, shrimp, insects, and undetermined organic material--made up the major part of the stomach volume (table 1). Amphipods and insects were barely represented in stomachs of larger fish. Use of shrimp, crabs, and fish increased in the intermediate size groups and reached a maximum in the 465- to 722-millimeter blue catfish. It is probable that the percentage of vegetation is somewhat exaggerated in this series of analyses because of the limited number of larger fish.

Blue catfish as small as 95 millimeters contained fish remains, though the transition from small invertebrates to fish and macroinvertebrates seemed to occur when the catfish were 293 millimeters in total length (table 2). In general, this agrees with the findings of Brown and Dendy (1961), who concluded, after analyzing 152 blue catfish from Alabama rivers, that the transition from invertebrates to fish as the major source of food occurred while the catfish were 203 to 330 millimeters in total length. Darnell (1958) after analyzing 78 stomachs, concluded that until blue catfish in Lake Pontchartrain, Louisiana, reached a size of 100 millimeters, they fed chiefly upon zooplankton. A stage that was dependent upon small bottom-inhabiting invertebrates was prominent in the 100- to 240-millimeter catfish, though fish appeared frequently

TABLE 1.--Occurrence of food items in digestive tracts of 59 blue catfish

[F = frequency of occurrence; P = percent volume]

Food items	Size range (millimeters)[1]									
	95-187		188-292		293-393		394-464		465-722	
	F	P	F	P	F	P	F	P	F	P
Crustacea:										
Amphipoda	8.00	7.41	5.20	1.57	-----	-----	-----	----	-----	-----
Penaeus sp.	24.00	2.15	8.00	30.94	28.50	11.01	25.00	3.07	25.00	28.27
Callinectes sapidus	-----	-----	21.00	16.28	-----	-----	25.00	3.96	50.00	15.46
Insecta:										
Diptera	12.00	3.90	5.20	.05	-----	-----	-----	----	-----	-----
Vertebrata:										
Anchoa mitchilli	-----	-----	-----	-----	28.50	8.78	-----	----	-----	-----
Cynoscion arenarius	-----	-----	-----	-----	14.20	3.96	-----	----	-----	-----
Mollienesia latipinna	-----	-----	-----	-----	14.20	.52	-----	----	-----	-----
Mugil sp.	-----	-----	8.00	.57	14.20	13.76	-----	----	-----	-----
Ictalurus sp.	-----	-----	-----	-----	14.20	.17	-----	----	-----	-----
Fish remains	20.00	14.50	5.20	26.17	14.20	1.20	50.00	2.97	50.00	18.11
Algae, filamentous	52.00	27.10	42.00	18.48	14.20	.03	-----	----	25.00	28.49
Vascular plants	48.00	5.40	42.00	1.26	14.20	.02	-----	----	50.00	9.67
Organic material (undetermined)	36.00	75.00	21.00	3.20	42.80	58.50	-----	----	-----	-----
Sand and silt	20.00	.42	5.20	.05	14.20	1.72	-----	----	-----	-----
Number examined	25	-----	19	-----	7	-----	4	----	4	-----
Number with food	24	-----	16	-----	5	----	3	----	4	-----

[1] Size ranges of approximate calculated age groups.

TABLE 2.--Occurrence of food items in digestive tracts of 40 channel catfish

[F = frequency of occurrence; P = percent volume]

Food items	Size range (millimeters)[1]							
	109-201		202-376		377-474		475-689	
	F	P	F	P	F	P	F	P
Crustacea:								
Amphipoda	4.30	6.11	10.00	1.40	-----	-----	-----	-----
Penaeus sp.	-----	-----	-----	-----	20.00	0.47	-----	-----
Callinectes sapidus	-----	-----	-----	-----	-----	-----	50.00	50.00
Insecta:								
Diptera	17.40	1.96	10.00	4.83	-----	-----	-----	-----
Vertebrata:								
Mollienesia latipinna	4.30	6.11	-----	-----	-----	-----	-----	-----
Anchoa mitchilli	17.40	12.41	10.00	4.02	40.00	44.44	-----	-----
Brevoortia patronus	-----	-----	-----	-----	40.00	-----	-----	-----
Fish remains	13.00	8.62	-----	-----	40.00	29.59	-----	-----
Algae, filamentous	47.90	17.98	30.00	36.20	20.00	9.00	-----	-----
Vascular plants	13.50	9.84	30.00	2.61	40.00	1.52	50.00	50.00
Organic material (undetermined)	13.00	32.35	40.00	36.25	60.00	12.16	-----	-----
Sand and silt	30.40	.73	20.00	14.02	20.00	.12	-----	-----
Number examined	23	-----	10	-----	5	-----	2	-----
Number with food	21	-----	10	-----	5	-----	1	-----

[1] Size range of approximate calculated age groups.

in their diets. Blue catfish more than 200 millimeters in length fed primarily on fish and other macroorganisms. Lambou (1961) found that 20 large blue catfish taken in southern Louisiana had eaten only blue crabs.

Channel Catfish.--This study indicated that diets of young channel catfish (to 376 millimeters in length) consisted primarily of amphipods, small insects, algae, and undetermined organic material. The diets of larger channel catfish included not only those materials but also fish and large crustaceans. Darnell (1958) examined the stomachs of channel catfish from Lake Pontchartrain and found that the smaller individuals (76 to 119 millimeters) had fed primarily on small bottom-inhabiting arthropods. Undetermined organic material, detritus, foraminifers, filamentous algae, and vascular plants were present; and sand made up about 8 percent of the material found.

Swingle (1954) suggested that catfish over 15.5 inches (393.7 millimeters) in total length should be regarded as predatory fish. This study indicates that a change in food, from invertebrates to fish, takes place when the blue catfish are 293 millimeters (11.5 inches) and when the channel catfish are 376 millimeters (14.8 inches) in length. Thus, this study, supported by that of Brown and Dendy (1961), suggests that blue and channel catfish may be predatory long before they reach the 16-inch group.

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Literature Cited

Brown, B. E., and J. S. Dendy.
1961. Observations of the food habits of the flathead and blue catfish in Alabama. Proceedings, 15th Annual Conference, Southeastern Association of Game and Fish Commissioners, 1961, p. 219-222.

Darnell, R. M.
1958. Food habits of fishes and large invertebrates of Lake Pontchartrain, Louisiana, and estuarine community. Institute of Marine Science, vol. 5, p. 370-374.

Lambou, V. W.
1961. Utilization of macro-crustaceans for food by freshwater fishes in Louisiana and its effects on the determination of predator-prey relations. Progressive Fish-Culturist, vol. 23, no. 1, p. 19-24.

Perry, W. Guthrie.
In press. Distribution and relative abundance of blue catfish, Ictalurus furcatus, and channel catfish, Ictalurus punctatus, with relation to salinity. Proceedings, 21st Annual Conference, Southeastern Association, Game and Fish Commissioners, 1967.

Swingle, H. S.
1954. Fish populations in Alabama rivers and impoundments. Transactions, American Fisheries Society, vol. 83, for the year 1953, p. 47-57.

During research on the oral immunization of hatchery-reared salmon and trout against furunculosis, it appeared that some of the variations in the immune response might be due to antigenic differences among the isolates of Aeromonas salmonicida. This possibility was examined by using the indirect fluorescent antibody technique to test individually 24 of the 72 isolates on file against each of 3 anti-A. salmonicida sera prepared in rabbits with 3 isolates of the organism. The results indicated that among the 24 isolates there were at least 7 serotypes. Further, the results indicated that there is a close serological relationship of isolates from hatcheries on a common water system or among which fish have been transferred.

In conjunction with requirements for registration and the labeling of fish control agents with the Food and Drug Administration, the efficacy of 4 chemicals has been established for 11 species of fish in 1,300 tests of 10,229 fingerlings and juveniles and 4,416 adults. Information on residues of those drugs required 1,400 chemical analyses.
